

# The Redington Mountain Wind Farm

## **Proposal to the Naval Air Station Brunswick, for Consideration of Wind Farm Development Impacts**



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## **1.0 Introduction**

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### **Request For Consideration**

Enclosed are details for a wind farm proposed for a site adjacent to the Navy's Search, Evasion, Rescue and Escape (SERE) training property located in Franklin County, Maine. Endless Energy Corporation (EEC), the manager of the project, is requesting approval by the Commander of the Naval Air Station Brunswick, or the responsible representative for the SERE facility, of the current design plans, which are outlined below.

The Maine permitting process requires EEC to notify abutting property owners of any potential impacts to their property. EEC has identified all known potential impacts and summarized them in this document.

EEC does not believe any of the impacts to be significant.

If your review of this material determines that one or more potential issues exist with the proposed design, we would like the opportunity to review the concerns with you, and modify our designs to minimize or prevent the problems.

## **2.0 Project Overview / Items To Consider**

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Endless Energy Corporation (EEC) is managing the development of a proposed wind farm along two mountain ridges in Redington Township, on the Redington Pond Range and Black Nubble mountains. The project is called the Redington Windfarm. The two mountains are owned by Redington Mountain Windpower LLC, of which Endless Energy is the manager.

The wind farm will consist of 30 modern wind turbines, able to generate a maximum of 90 megawatts of renewable electric power (nameplate capacity). In a year, the wind turbines will generate over 250 million kilowatt hours of electricity, enough to power more than 40,000 Maine homes.

The wind farm is designed capture the strong winds available at higher elevations. To obtain maximum efficiency, EEC is proposing to place the wind turbines along the highest points on the ridge. Three of these locations are in close proximity to the edge of the Navy's SERE base property.

Please refer to the enclosed map for further details of the turbine layout and design.

In consideration for the potential minor impacts, EEC would be amenable to offering assistance to the Navy. EEC can offer use of the wind farm property for training, use of our reference towers for communication relays or cellular phone antenna installation, or would be willing to consider other mutually beneficial arrangements.

## **Summary of items that need review:**

The following three issues, summarized here and addressed in detail below, are of potential interest to the Navy.

### **1. Developmental Setback Issues**

Acknowledgement and acceptance that the siting of turbines #11, #25 and #26 will be at a distance of approximately 55m (172') feet from the Navy property line. This placement will result in a vegetative buffer distance of approximately 50m for the base of the turbine and a setback distance of 7.5m (25') for the turbine blades. This is a standard commercial setback distance.

Acknowledgement and acceptance of the occasional winter occurrence of ice throw from three turbines, out to a predicted maximum distance of 252m (830') from each turbine. Although unlikely, ice could potentially be shed to a distance of approximately 200m onto the edges of Navy property.

### **2. Minimum FAA Lighting Issues**

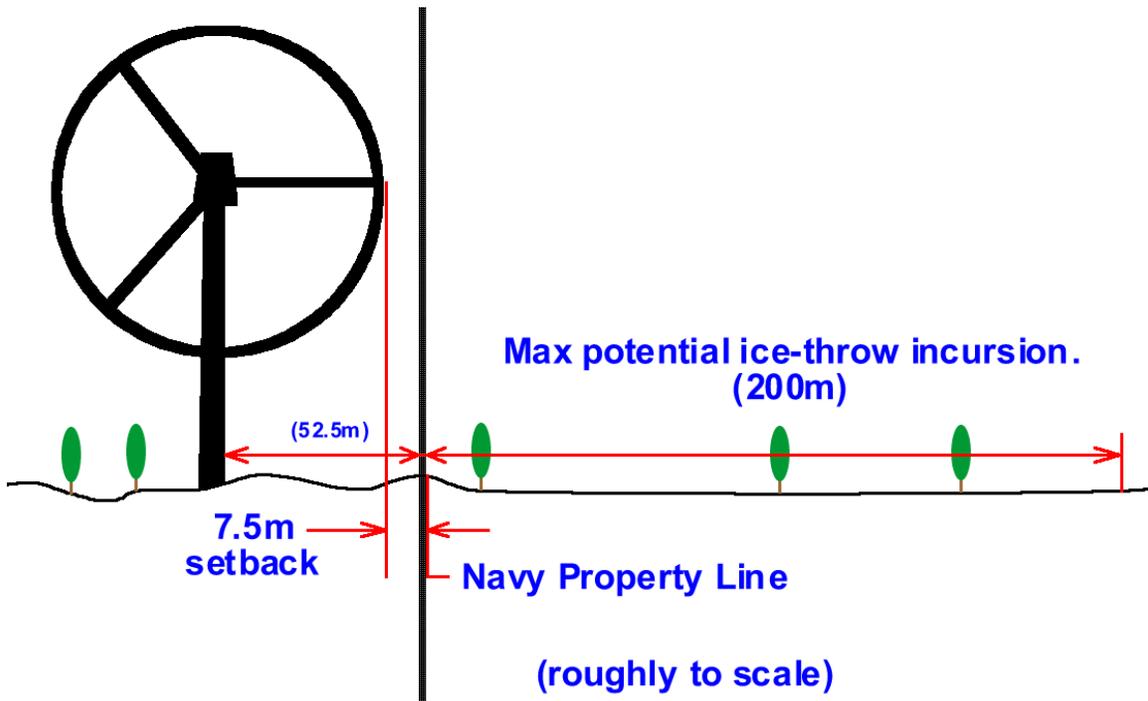
Preliminary acceptance of the two-stage lighting plan for the wind farm, including providing second-stage control to SERE school personnel. It is understood that the wind farm lighting plan will be submitted to the Federal Aviation Administration (FAA), who will have the final authority to approve the design.

### **3. Sound Levels**

Acknowledgement and acceptance ("no adverse impact") of the predicted sound levels from the wind turbines in operation.

### 3.0 Development Setback Issues

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There are two property setback issues to review. Three of the thirty turbines are close to the Navy SERE school property. We are requesting acknowledgement and authorization to locate three wind turbines as described below. The current design layout utilizes the Standard Commercial Setback of 7.5m (25').

#### Property Setback

EEC is requesting authorization to place three wind turbines near the southern edge of our property, as shown in the Turbine Location and Lighting Map and the illustration above. The turbines of note are turbines 11, 25, and 26. Since the turbines “yaw” (turn to face the wind) the illustration above shows a “worst case” scenario of a wind direction nearly due east or due west. Prevailing winds in the area are westerly.

This setback distance would place the base of the turbines within 47.5m (156') of the Navy's property line and the turbine blades, (at their closest point) would be 7.5m (25') away from Navy property.

## **Potential Ice-Throw Hazard**

Although not a regular occurrence, wind turbines can potentially shed ice. A setback consideration is the potential for ice-shedding. Ice shedding occurs when ice accumulated on the wind turbine starts to thaw, break loose, and fall to the ground. The Redington wind farm expects to have icing events occur several times during the winter months.

To date, there have been no reported injuries from an ice throw event from any wind farm, but the potential risk is worth noting.

Generally, wind turbines are turned “off” during an icing event (snow, frozen clouds, freezing rain, etc). When a turbine is “off”, any ice shed will fall to the base of the turbine.

If the turbines are operating during an icing event, ice could be thrown from the blades. The general accepted formula used to calculate ice-throw diameter distance is “ $1.5 \times (\text{tower height} + \text{blade diameter})$ ”. This distance would correspond to 252m (826’). This could place ice throws onto Navy property as shown on the diagram above.

## **Recommended Course of Action**

Preliminary discussions with Capt. C. M. Evans, USMC (Mardet OIC, SERE Dept. Head) have been helpful. Capt Evans has initially indicated that the proximity of the turbines alone should not pose a problem for SERE base training exercises, but that proper precautions would have to be taken to ensure student and instructor safety once the wind farm is up.

Capt. Evans suggested that the joint property border might need supplemental posting or some other form of identification, including the ice throw concern.

We suggest that our common border be marked with prominent signage to reduce the chances of people wandering onto Navy training property. An ominous warning sign should be sufficient, placed at frequent intervals, wherever the development will border the Navy property. We would also assist in marking any areas subject to potential ice throw (on Navy property) with smaller signs to sufficiently warn Navy personnel of any potential ice-throw hazards.

## **4.0 FAA Lighting**

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The Redington Windfarm turbines will be located in a visible area. One of the goals of the development process is to minimize the turbines obtrusiveness, particularly at night. If the project were to strictly adhere to the current FAA guidelines for lighting, the project would have an unnecessary number of blinking and flashing lights.

Our turbine lighting proposal has not yet been submitted to the FAA. The final lighting design will need to satisfy both the Navy's and the FAA's interests. The following lighting scheme has been developed from initial discussions with the Navy.

We are proposing a two-stage lighting scheme. A minimal initial lighting scheme will be supplemented by secondary lighting that will be controlled by pilots (the lighting activation control is similar to nighttime lighting utilized by many small airports).

EEC has opened discussions with the FAA and the Navy to determine the minimal lighting requirements necessary to satisfy both the FAA and Navy. The FAA has strict guidelines for the lighting of elevated structures, but have been flexible in their requirements for wind farms. We have proposed a minimal lighting scheme for the wind farm, as outlined below.

Please refer to the enclosed map that details the turbine lighting scheme.

### **First Stage**

The first stage pattern will consist of lights on only the two highest-elevation turbines, one each on Redington and Black Nubble mountains. The light color will be red, cycling to achieve 20 FPM (flashes per minute), with a slow-on, slow-off profile, similar to a lighthouse. During the spring and fall bird migration periods, avian collisions will be monitored closely, and if found necessary, the lamp profiles will be modified to a white strobe, to minimize bird attraction.

### **Second Stage**

The second stage pattern is intended for navigation in periods of bad weather, for passing air traffic, and for helicopter or other operations at the U.S. Navy SERE facility. Lights will be installed on all corner turbines to present a clear aerial outline of the wind farm layout. The

second stage lamp color will also be red, with the same cycling as the other lights. All lights will be synchronized to light simultaneously.

The second stage illumination will be activated either by wind farm operators from the operations center (for severe weather), by Navy personnel at the SERE facility, or by passing aircraft on-demand. Navigation lights will be activated by a standard aircraft radio transmitter on a unique FAA-assigned frequency. When keyed by radio, the lights will stay on for 5 minutes and then automatically turn off.

### **Recommended Course of Action**

The final lighting plan will require FAA approval. A key person should be assigned by the Navy to review this final plan and approve.

## **5.0 Sound**

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Modern wind turbines have made significant improvements in engineering and design to reduce sound emissions. Today's wind turbines are quiet and are barely discernable over natural background wind noise from a short distance. (See attached fact sheet from the American Wind Energy Association.)

Wind turbines generate sound from two sources: the nacelle (which houses the generator and gearbox at the top of the tower) and the blades as they "swoosh" by. Both the turbine nacelle and blades have been extensively studied and specifically engineered to minimize sound output. Turbine blades have been engineered to eliminate aerodynamic drag, and nacelles are designed with sound insulation.

For multiple wind turbines on a mountain ridge, sound from the turbine blades will vary with wind speed, from no sound (no wind) to the loudest sound, when rotors are turning at speed. Because distance from each sound source varies with the location of the listener and sound decreases as distance increases, the expected sound level is not a straightforward calculation. The best way to represent the expected sound levels for any given point near the wind farm is via a computer-generated sound map, showing contours of constant sound levels. Redington's sound map is shown in an enclosed document.

The Search Evasion and Rescue E-training (SERE) school is located on heavily forested land directly south of the wind farm, federally owned property that abuts the proposed development.

Permanent installations of the SERE school include an administration building and a helipad, located approximately 2.5 miles south of the project's Black Nubble property line, which are the only consistently occupied facilities on the property. The rest of the area is used intermittently for training in outdoor skills.

Training exercises for Navy personnel are occasionally staged in the forested area to the south of the project, but not in the steep terrain immediately south of the property line. Operating sound levels for all active training areas will thus be at 40dBA, a soft conversation level, or quieter, as the enclosed sound level map shows. Construction sounds are also likely to be audible in the training areas, but at the same unobtrusive level, due to distance.

Because the Navy does not-use the steep terrain immediately adjacent to the common boundary between the properties, and because their use of surrounding area is intermittent and variable, occurring at distances where sound levels are expected to range from quiet to inaudible, sounds from the wind farm sound is not expected to adversely impact the SERE school.

See the enclosed Vestas sound map that details the sound levels expected in the SERE base area.

**6.0 Acceptance of Proposed Terms.**

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By signing below the U.S. Navy hereby approves the above proposal and accepts the conditions and proposed activities of Endless Energy Corporation and Redington Mountain Windpower LLC on property adjacent to the SERE school, and agrees to enter into such documents and agreements as may be reasonably requested by Endless Energy Corporation and Redington Mountain Windpower LLC and their respective successors and assigns in connection with the foregoing.

Accepted and Agreed by: \_\_\_\_\_

Printed name: \_\_\_\_\_

Title: \_\_\_\_\_